Wind tunnel AER stats

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Get wind tunnel data only.

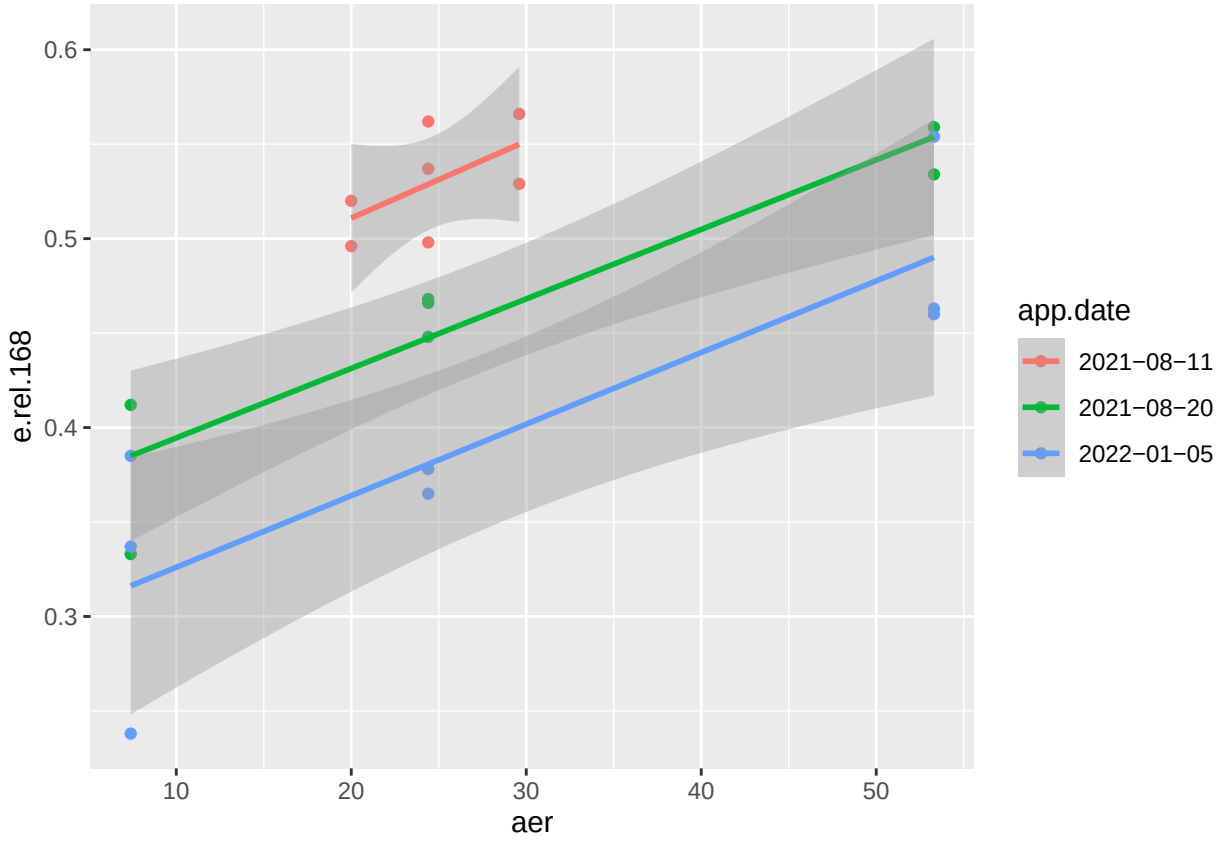
```
wsumm <- subset(isumm, meas.tech == 'Wind tunnel')
dfsumm(as.data.frame(wsumm))
```

```
##
##  22 rows and 23 columns
##  22 unique rows
##                      trial.nm   app.date    pmid   meas.tech meas.tech2     aer
## Class                character  character integer   character  character numeric
## Minimum               A 11 Aug 2021-08-11    1904 Wind tunnel         wt     7.4
## Maximum               C 05 Jan 2022-01-05    1925 Wind tunnel         wt    53.3
## Mean                      <NA>       <NA>    <NA>        <NA>       <NA>    27.2
## Unique (excld. NA)           3          3      22           1          1       5
## Missing values               0          0       0           0          0       0
## Sorted                    TRUE       TRUE    TRUE        TRUE       TRUE   FALSE
##
##                          aer.grp     cta air.temp.mean air.temp.min
## Class                     factor numeric       numeric      numeric
## Minimum              Low 7 or 20     181          2.46         -3.4
## Maximum             High 30 or 54     211          15.4         11.4
## Mean                   Medium 25     193          10.5         4.93
## Unique (excld. NA)             3       3             6            6
## Missing values                 0       0             0            0
## Sorted                     FALSE   FALSE         FALSE        FALSE
##
##                     air.temp.max wind.2m.mean wind.2m.min wind.2m.max rain.cum
## Class                    numeric      numeric     numeric     numeric  numeric
## Minimum                      8.5          0.1         0.1         0.1        0
## Maximum                     22.3         0.72        0.72        0.72        0
## Mean                        17.1        0.367       0.367       0.367        0
## Unique (excld. NA)             6            5           5           5        1
## Missing values                 0            0           0           0        0
## Sorted                     FALSE        FALSE       FALSE       FALSE     TRUE
##
##                     rain.cum.48 j.NH3.mean j.NH3.min j.NH3.max e.cum.final
## Class                   numeric    numeric   numeric   numeric     numeric
## Minimum                       0     0.0763         0     0.431        16.1
## Maximum                       0      0.218    0.0309      3.54        39.4
## Mean                          0      0.165    0.0105       2.2        31.4
## Unique (excld. NA)            1         20        19        22          22
## Missing values                0          0         0         0           0
## Sorted                     TRUE      FALSE     FALSE     FALSE       FALSE
```

```
##
##                     e.rel.final e.cum.168 e.rel.168
## Class                   numeric   numeric   numeric
## Minimum                   0.261      14.7     0.238
## Maximum                   0.585      39.2     0.566
## Mean                      0.472      30.7     0.459
## Unique (excld. NA)           22        21        22
## Missing values                0         0         0
## Sorted                    FALSE     FALSE     FALSE
##
```

```
ggplot(wsumm, aes(aer, e.rel.168, colour = app.date)) +
  geom_point() + geom_smooth(method = lm)
```

```
## `geom_smooth()` using formula 'y ~ x'
```




```
m1 <- lm(e.rel.168 ~ aer + factor(app.date), data = wsumm)
summary(m1)
```

```
##
## Call:
## lm(formula = e.rel.168 ~ aer + factor(app.date), data = wsumm)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.079013 -0.021060  0.002061  0.019678  0.067987
##
## Coefficients:
```

```
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 0.4373544  0.0187755  23.294 6.83e-15 ***
## aer                         0.0037501  0.0005039   7.442 6.75e-07 ***
## factor(app.date)2021-08-20 -0.0816075  0.0199897  -4.082 0.000699 ***
## factor(app.date)2022-01-05 -0.1480920  0.0194106  -7.629 4.78e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03728 on 18 degrees of freedom
## Multiple R-squared:  0.8504, Adjusted R-squared:  0.8255
## F-statistic: 34.12 on 3 and 18 DF,  p-value: 1.227e-07
```

```
anova(m1)
```

```
## Analysis of Variance Table
##
## Response: e.rel.168
##                  Df   Sum Sq  Mean Sq F value    Pr(>F)
## aer               1 0.061325 0.061325  44.130 3.103e-06 ***
## factor(app.date)  2 0.080911 0.040456  29.113 2.283e-06 ***
## Residuals        18 0.025013 0.001390
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(m1)
```

```
##                                 2.5 %       97.5 %
## (Intercept)                 0.397908439  0.476800373
## aer                         0.002691501  0.004808721
## factor(app.date)2021-08-20 -0.123604359 -0.039610631
## factor(app.date)2022-01-05 -0.188872193 -0.107311784
```

```
drop1(m1, test = 'F')
```

```
## Single term deletions
##
## Model:
## e.rel.168 ~ aer + factor(app.date)
##                  Df Sum of Sq      RSS     AIC F value    Pr(>F)
## <none>                        0.025013 -141.15
## aer               1  0.076972 0.101985 -112.23  55.391 6.749e-07 ***
## factor(app.date)  2  0.080911 0.105925 -113.39  29.113 2.283e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
m2 <- lm(e.rel.168 ~ aer * factor(app.date), data = wsumm)
summary(m2)
```

```
##
## Call:
## lm(formula = e.rel.168 ~ aer * factor(app.date), data = wsumm)
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.078183 -0.020660  0.002845  0.020009  0.068817
##
## Coefficients:
```

```
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                      0.4295161  0.1023309   4.197 0.000682 ***
## aer                              0.0040684  0.0041105   0.990 0.337024
## factor(app.date)2021-08-20      -0.0717983  0.1060734  -0.677 0.508155
## factor(app.date)2022-01-05      -0.1413697  0.1052222  -1.344 0.197845
## aer:factor(app.date)2021-08-20 -0.0003892  0.0041972  -0.093 0.927278
## aer:factor(app.date)2022-01-05 -0.0002796  0.0041692  -0.067 0.947363
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03952 on 16 degrees of freedom
## Multiple R-squared:  0.8506, Adjusted R-squared:  0.8039
## F-statistic: 18.22 on 5 and 16 DF,  p-value: 4.24e-06
```

```
anova(m2)
```

```
## Analysis of Variance Table
##
## Response: e.rel.168
##                      Df   Sum Sq  Mean Sq F value    Pr(>F)
## aer                   1 0.061325 0.061325  39.266 1.125e-05 ***
## factor(app.date)      2 0.080911 0.040456  25.904 9.610e-06 ***
## aer:factor(app.date)  2 0.000025 0.000013   0.008     0.992
## Residuals            16 0.024988 0.001562
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(m2)
```

```
##                                       2.5 %      97.5 %
## (Intercept)                      0.212584357 0.646447790
## aer                             -0.004645421 0.012782167
## factor(app.date)2021-08-20      -0.296663881 0.153067343
## factor(app.date)2022-01-05      -0.364430710 0.081691378
## aer:factor(app.date)2021-08-20 -0.009286814 0.008508499
## aer:factor(app.date)2022-01-05 -0.009117831 0.008558640
```

```
drop1(m2, test = 'F')
```

```
## Single term deletions
##
## Model:
## e.rel.168 ~ aer * factor(app.date)
##                      Df  Sum of Sq      RSS     AIC F value Pr(>F)
## <none>                               0.024988 -137.17
## aer:factor(app.date)  2 2.5061e-05 0.025013 -141.15   0.008  0.992
```